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AD NO.

REPORT NO: FTD-2780
DATE: 15 JANUARY 1962

MATERIAL - 17-7PH STAINLESS STEEL IN THE
TH1050, RH1050, RH950 HEAT TREAT CONDITION,
EVALUATION TEST OF

62-2-3
XEROX

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GENERAL DYNAMICS | FORT WORTH

TEST DATA MEMORANDUM

F-TDM NO. 2780
MODEL B-58
TEST NO. F-0740

TEST: Material 17-7 PH Stainless Steel in the TH 1050, RH 1050, RH 950 Heat Treat Condition, Evaluation Test of -

OBJECT: To obtain tensile and fatigue properties of 17-7 PH processed through the Norto braze (quartz lamp) system.

Procedure: Testing was done on .010" and .026" ga. 17-7 PH stainless steel sheet supplied by the Northrop Corporation. The samples were in the RH 950, RH 1050, TH 1050 and A conditions of heat treatment. The location and identity of test specimen blanks on the sheets was established by the Convair - FW Materials and Processes Group. The specimen blanks in condition A were heat treated to the TH 1050 condition at Convair FW with the following cycle.

Heat to 1650-1690 F for 5-10 minutes (argon atmosphere)
Furnace cool to 1400 F and hold at 1400 F for 90 minutes (argon)
Air cool to room temperature (argon)
Cool to -20 F for 30 minutes
Heat to 1050 F for 90 minutes (argon)

Fifty-four of the sample blanks were given 50 hrs. salt spray exposure per FTMS 151 method 811. Specimens were then fabricated and mechanical properties obtained according to the following schedule:

Tensile specimens (Fig 1-8)	33
Tensile specimens (Fig 1-8)	54 (salt sprayed)
Notch tensile specimens (Table II)	18
Fatigue Specimens (Fig 2)	14

Tensile and notch tensile specimens were tested on a 5000 lb. capacity Baldwin universal test machine equipped with a MA-1 microformer recorder. Load-deformation curves for each tensile specimen were recorded autographically using Baldwin PS5M or P101M extensometers. Fatigue specimens were tested on a Sonntag universal fatigue testing machine; model SF-1U. All specimens were tested at a stress of 100 ksi with an R factor of .1.

Results & Discussion: Results are included in Tables I, II, and III. Many tensile specimens particularly those in the RH 950 after salt spray for 50 hours, failed with no ductility. Some of these specimens failed before .2% offset yield strength was reached. The RH 950 material was so brittle that all the notch tensile specimens were broken during the machining operation.

Convair specification FMS0036D states that at 100 ksi stress fatigue specimens shall withstand a minimum of 100,000 cycles. Each fatigue specimen exceeded this value. See Tables I, II, and III.

Conclusion: The results of the test consist of empirical data.

WITNESS

DATE 3-2-61

BY

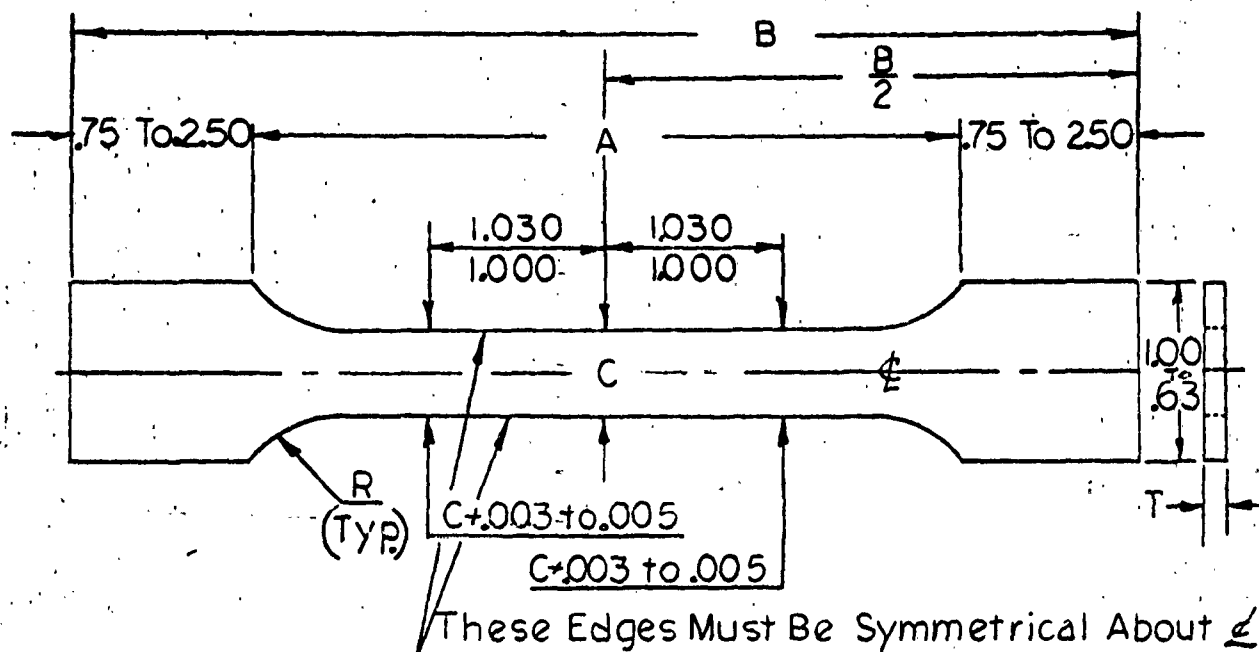
S. J. Glorioso

CHECKED

W. P. Kiefer

APPROVED

J. H. Hordgum
A. W. Wilson



1. Unless otherwise specified tolerances are as follows:
Linear dimensions - .xx \pm .03 .xxx \pm .010
2. T = Material stock thickness
3. Polish edges of reduced section longitudinally with 0 grade emery paper.
4. Material to be as specified.
5. Grain direction to be longitudinal unless otherwise specified.

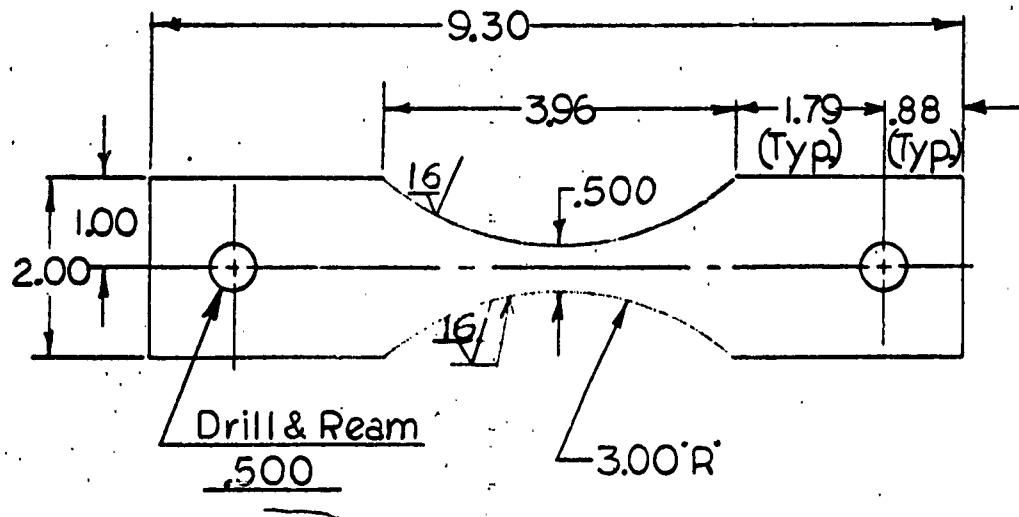
Dash No	A	B	C	R (Min)
- 8	4.00	9.00	.500	1.00
- 9	2.75	4.25	.500	.25
- 10	4.00	9.00	.250	1.00
- 11	2.75	4.25	.250	.25

DRAWN	R. Carley	DATE	8/1/47	TENSILE TEST SPECIMEN - FLAT	FTJ. 10940
CHECKED	W. J. J. J.	DATE	8/1/47		Scale - Full
ENG.					
PROJECT				CONSOLIDATED VULTEE AIRCRAFT CORPORATION FORT WORTH DIVISION - FORT WORTH, TEXAS	

ISSUED:

REVISED:

FIGURE 1



NOTE:

Center Holes On Line Of Symmetry Through Specimen

$$K_t = 1.036$$

Ref. ATA Fatigue Hdbk. 3.32-16 No. 15

MAT'L.		H'TREAT		FATIGUE SPECIMEN		TCOL NO. FTJ-10940-	
TOL.		ANG.				71	
0.0	±	0.00	±	0.000	±	REPLACES	
±.030		±.010					
DRAWN		APPROVED		CONVAIR A DIVISION OF GENERAL DYNAMICS CORPORATION (FORT WORTH)		DEPT. 34 FW-32-8-34	
CHECKED		DATE				DRAWING FORM	

FIGURE 2

CONVAIR—FORT WORTH
TABULATION SHEET

TABLE I TENSILE DATA FOR
17-7 PH SHEET MAT'L

SPECIMEN NO.	HT TREAT CONDITION	EXPOSURE	THICKNESS (IN)	YIELD STR. (KSI)	ULT. T.S. (KSI)	ELONG. IN 2" (%)	SPECIMEN DIRECTION	TEST RESULTS
A-1	RH 950		.010	230.0	224.0	0.0	TRAN	
A-2				209.1	221.8	4.0		
A-3	Y	50 HRS. SALT SPRAY			154.0	0		FAILED BELOW YIELD STR.
A-4		" " " "			166.3	0		" " " "
A-5	TH 1050 (1)			198.0	203.9	5.0		
A-6				198.0	204.9	5.0		
A-7	Y	50 HRS. SALT SPRAY		201.0	203.9	1.0		
A-8		" " " "		198.0	200.0	1.0		
B-1	RH 950			211.3	225.5	2.0		
B-2				—	233.0	—		EXTENSOMETER TROUBLE—FAILED AT EXTENSOMETER ATTACHMENT
B-3	Y	50 HRS. SALT SPRAY			110.0	0		FAILED BELOW YIELD STR.
B-4		" " " "			152.0	0		" " " "
B-5	TH 1050 (1)			199.0	205.9	4.0		
B-6				210.4	215.6	4.0		
B-7	Y	50 HRS. SALT SPRAY		199.0	204.9	2.0		
B-8		" " " "		190.4	195.2	—		FAILED OUT OF GAGE MARKS
C-1	RH 950			207.5	219.8	—		
C-2				215.1	227.4	—		FAILED OUT OF GAGE MARKS
C-3	Y	50 HRS. SALT SPRAY			111.3	0		FAILED BELOW YIELD STR.
C-4		" " " "			117.9	0		" " " "
C-5	TH 1050 (1)			207.1	213.3	5.0		
C-6				208.2	214.3	7.0		
C-7	Y	50 HRS. SALT SPRAY		197.1	202.9	2.0		
C-8		" " " "		201.0	203.9	1.5		

(1) REC'D IN ANNEALED CONDITION; HT TREATED TO TH 1050 CONDITION AT CONVAIR FW

CONVAIR—FORT WORTH

TABULATION SHEET

TABLE I CONTD. TENSILE DATA FOR

17-7 PH SHEET METAL

SPECIMEN NO.	MT. TREAT CONDITION	EXPOSURE	THICKNESS (IN.)	YIELD STR. (KSI)	ULT. T. S. (KSI)	ELONG. IN 2" (%)	SPECIMEN DIRECTION	FAILED	BELOW YIELD STR.
D-7	TH 1050		.010	176.0	189.6	7.0	TRAN		
D-8				176.0	189.6	7.0	↓		
D-9				176.0	191.7	7.0			
D-1		50 HRS. SALT SPRAY		171.9	185.4	5.0	LONG		
D-2				174.0	187.5	6.0	↓		
D-3				169.0	170.8	8.0			
D-4					156.6	1.0	TRAN	FAILED	BELOW YIELD STR.
D-5				158.7	175.0	7.0	↓		
D-6				148.2	156.4	2.0			
E-7	RH 1050			191.6	197.6	6.0	TRAN		
E-8				192.2	197.2	5.0	↓		
E-9				191.2	197.2	4.0			
E-1		50 HRS. SALT SPRAY		181.0	187.0	7.0	LONG		
E-2				181.0	187.0	7.0	↓		
E-3				173.6	176.4	6.0			
E-4				168.2	171.8	3.0	TRAN		
E-5				178.9	182.7	3.0	↓		
E-6				195.0	190.0	6.0			
F-7	RH 950			236.4	244.5	2.0	TRAN		
F-8				234.9	243.0	2.0	↓		
F-9				233.9	242.0	2.0			
F-1		50 HRS. SALT SPRAY		211.7	219.9	4.0	LONG		
F-2				208.8	217.9	4.0	↓		
F-3				212.2	218.6	1.0			
F-4					203.5	0	TRAN	FAILED	BELOW YIELD STR.
F-5				215.5	224.7	2.0	↓		
F-6					212.2	0		FAILED	BELOW YIELD STR.

CONVAIR—FORT WORTH
TABULATION SHEET
TABLE I CONTD. TENS & DATA FOR
17-7 PH SHEET MAT'L

SPECIMEN NO.	HT TREAT CONDITION	EXPOSURE	THICKNESS (IN.)	YIELD STR. (KSI)	ULT. T.S. (KSI)	ELONG. IN. 2" DIRECTION (%)	SPECIMEN DIRECTION	NOTES
G-7	RH 950			216.6	224.7	3.0	TRAN	
G-8			.010	215.0	224.1			
G-9				215.6	224.7	4.0		FAILED AT EXTENSOMETER ATTACHMENT
G-1		50 HRS SALT SPRAY		194.2	202.4	2.0	LONG	
G-2				192.0	201.1	4.0		
G-3				212.0	221.0	4.0		
G-4				214.1	221.6	0	TRAN	BELOW YIELD STR.
G-5				214.6	221.6	0		
G-6				204.2	204.2	0		FAILED BELOW YIELD STR.
H-1	TH 1050		.026	150.8	182.1	10.0	TRAN	
H-2				150.8	180.9	9.0		
H-3				157.5	186.2	9.0		
H-4		50 HRS SALT SPRAY		148.9	176.9	5.0	TRAN	
H-5				149.6	175.8	4.0		
H-6				146.6	177.3	4.0		
H-7				150.0	175.2	10.0	LONG	
H-8				152.6	176.7	9.0		
H-9				158.0	181.2	8.0		
I-1	RH 1050			186.1	200.5	9.0	TRAN	
I-2				185.6	200.4	9.0		
I-3				185.2	198.4	9.0		
I-4		50 HRS SALT SPRAY		179.3	192.2	5.0	TRAN	
I-5				178.5	190.6	4.0		1.5
I-6				183.3	194.4	7.0		UP
I-7				182.9	193.7	8.0	LONG	
I-8				179.7	192.2	7.0		
I-9				179.7	189.5	7.0		

CONVAIR—FORT WORTH
TABULATION SHEET

TABLE I CONTD, TENSILE DATA FOR

17-7 PH SHEET MAT'L

SPECIMEN NO.	HT TREAT CONDITION	EXPOSURE	THICKNESS (IN.)	YIELD STR. (KSI)	ULT. T.S. (KSI)	ELONG IN 2" (%)	SPECIMEN DIRECTION	FAILED OUT OF GAGE MARKS	FAILED AT EXTENSOMETER ATTACHMENT
J-1	RH 950		.025	214.9	220.6	1.0	TRAN		
J-2				213.3	217.3	—	↓		
J-3				213.4	219.9	—			
J-4		50 HRS. SAT SPRAY			163.1	0	TRAN	FAILED BELOW YIELD	STR.
J-5					174.4	0	↓	"	"
J-6					161.4	0		"	"
J-7					182.4	0	LONG	"	"
J-8					199.6	0	↓	"	"
J-9					182.7	0		"	"

CONVAIR—FORT WORTH
TABULATION SHEET

TABLE II

NOTCH TENSILE DATA

FOR 17-7 PH SHEET METAL

SPECIMEN NO.	HT. TREAT CONDITION	THICKNESS (IN.)	NOTCH RADIUS R ₁ (IN.)	NOTCH RADIUS R ₂ (IN.)	NOTCH STRENGTH (KSI)	BROKE DURING MACHINING OPERATION	NOTCH CONFIGURATION
K-1	TH 1050	.025	.008	.008	202.8	"	
K-2			.008	.008	196.6	"	
K-3			.010	.005	196.6	"	
K-4			.006	.010	198.2	"	
K-5	Y		.005	.010	209.0	"	
K-6			.008	.007	207.9	"	
L-1	RH 1050		.005	.010	192.2		
L-2			.006	.007	192.2		
L-3			.006	.008	197.2		
L-4			.006	.006	196.7		
L-5	Y	Y	.007	.007	192.8		
L-6			.008	.008	195.6		
M-1	RH 950						
M-2		"	"	"		"	
M-3		"	"	"		"	
M-4		"	"	"		"	
M-5	Y	"	"	"		"	
M-6		"	"	"		"	

**CONVAIR—FORT WORTH
TABULATION SHEET**

TABLE III
TENSION - TENSION FATIGUE DATA
R=0.1 FOR 17-7 PH SHEET MAT'L

SPECIMEN NO.	HT TREAT CONDITION	THICKNESS (IN.)	MAX STRESS (KSI)	CYCLES $\times 10^{-3}$	SPECIMEN DIRECTION				
N-1	TH 1050	.010	100	8,319	TRAN				
N-2		"							
T-1		.025		10,000				RUNOUT - NO FAILURE	
T-2		"		12,000				RUNOUT - NO FAILURE	
P-1	RH 1050	.010		13,000				RUNOUT - NO FAILURE	
P-2		"		136					
V-1		.025		235					
V-2		"							
R-1	RH 950	.010		10,000				RUNOUT - NO FAILURE	
R-2		"		230					
S-1		.010		576					
S-2		"		285					
W-1		.025		285					
W-2		"		892					